
AFS and DFS Growth at JPL

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JPL

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Outline

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Outline (continued)

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Introduction

- **JPL is NASA's lead center for robotic exploration of the solar system**
 - Operating division of Caltech
 - Workforce is about 6000 employees
- **EIS is JPL's Enterprise Information System Project**
 - Provides information infrastructure for laboratory-wide interoperability
 - Includes File Service and 8 other Services (Network, Security, Directory, Remote Procedure Call, Time Synchronization, Data Access, Messaging, and Systems Management)

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Overview

- **Goal for EIS File Service is to develop and deploy a service which encourages all JPL employees and contractors to use DFS to efficiently:**
 - Share files
 - Publish web pages
 - Access tools
- **Problem**
 - JPL is a heterogeneous environment that includes Sun, HP, Windows 3.1, Windows 95, Windows NT, and Macintosh users
- **Solution**
 - Use AFS as a stepping stone to DFS deployment

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AFS Overview

- Automated account creation and modification through a web interface
- Over 1000 AFS users
- 5 AFS database servers
- 10 AFS file servers
- Protocol translators for Macintosh and Windows 95 users
- Native client for Windows NT users
- Tape backup with DLT stackers
- Drag and drop web publishing for users

AFS Clients

- **Unix**
 - Sun: Use Transarc native client
 - HP: Use Transarc native client
- **Windows**
 - Windows 3.1: Use Platinum Technology translator client
 - Windows 95: Use Platinum Technology translator client
 - Windows NT: Use Transarc native client
 - Originally used Samba translator
- **Macintosh**
 - Macintosh 7: Use Platinum Technology translator client (still under evaluation)
 - Currently using Netatalk translator client (from University of Michigan)

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AFS Servers

- **AFS Database Servers**
 - 5 AFS Database Servers (Sun)
 - Both sides of JPL's Internet firewall
- **AFS File Servers**
 - 10 AFS File Servers (Sun)
 - Total of 625.8 GB in place (physical capacity)
 - Both sides of JPL's Internet firewall
- **AFS Protocol Translators**
 - 6 AFS Protocol Translators (Sun)
- **AFS Web Servers**
 - 3 AFS Web Servers (Sun)

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Web Publishing

- EIS File Service provides a mechanism to publish web pages from AFS (and eventually DFS)
- Provides web publishing for individual users and groups (www subdirectory)
- Default access to web pages is restricted to JPL networks
- Users and groups can follow a procedure to make specific directories visible outside JPL
- Same approach is being used for the DFS web server
- Web servers use the Netscape Enterprise Server software

Tool Distribution

- **AFS is used as a mechanism to distribute tools**
 - Support up to 11 different binary formats for each tool package
 - **Unix tools**
 - 107 packages (mostly freely distributed software)
 - **Windows tools**
 - 24 packages (mostly site licensed software)
 - **Mac tools**
 - 9 packages (mostly site licensed software)
 - **On-line tool catalog is organized by platform and packages**
 - Searchable through a web interface
 - **On-line documentation (man pages) for Unix tools**
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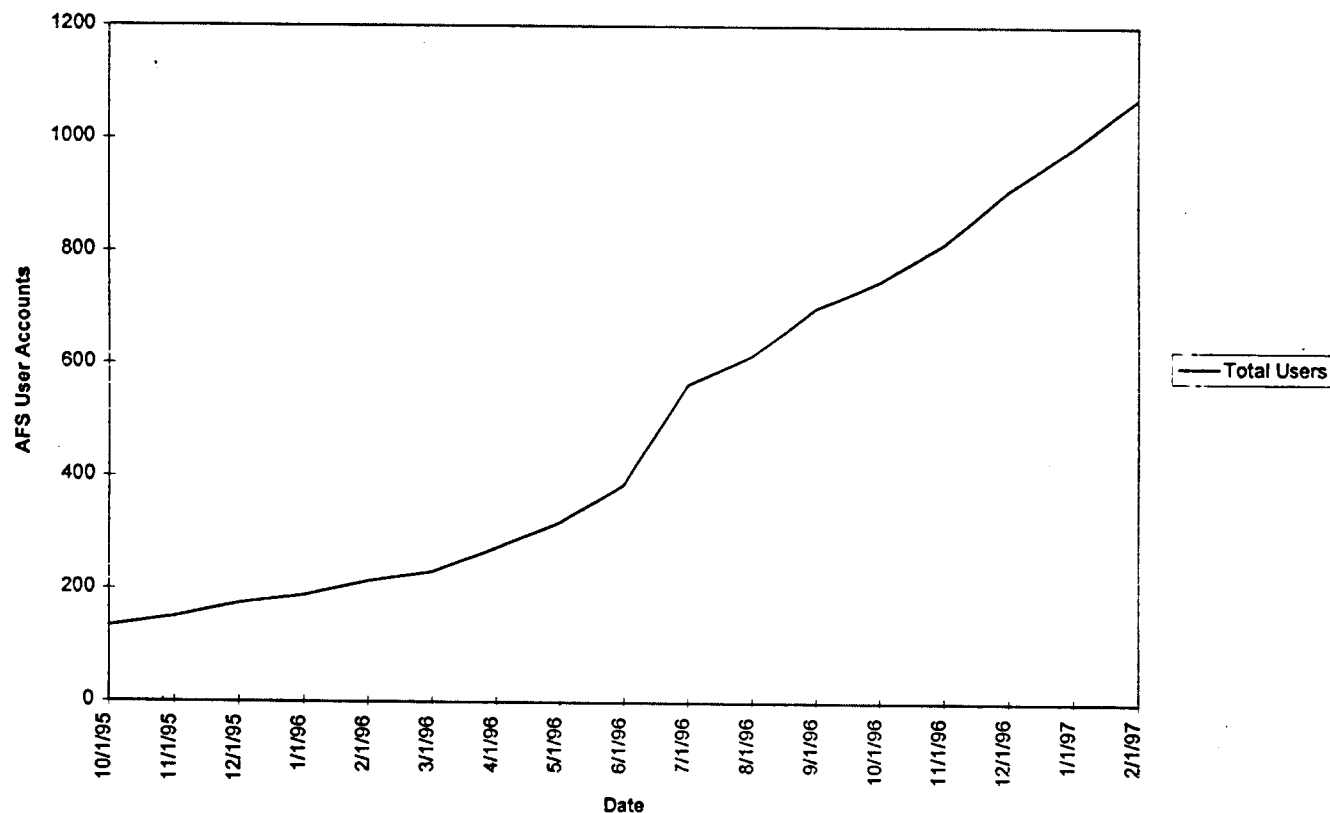
AFS Growth

- AFS operations began on 4/1/95
- EIS architecture published by Steve Jenkins on 11/1/95
- Metrics show history of AFS growth since 10/1/95 in terms of:
 - AFS User Accounts
 - AFS User Requests
 - AFS Group Directories
 - AFS Disk Space

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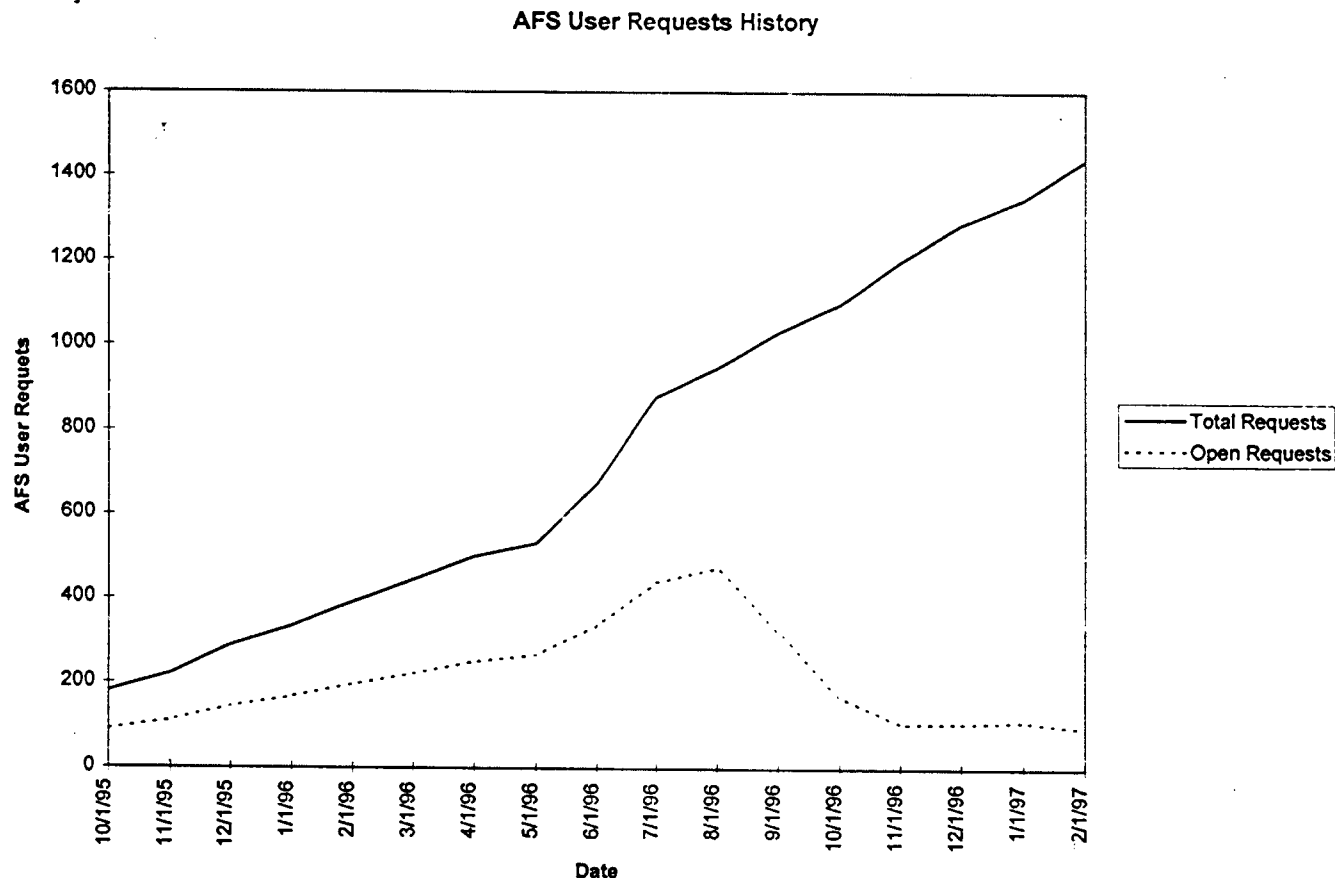
AFS User Accounts History

AFS User Accounts History



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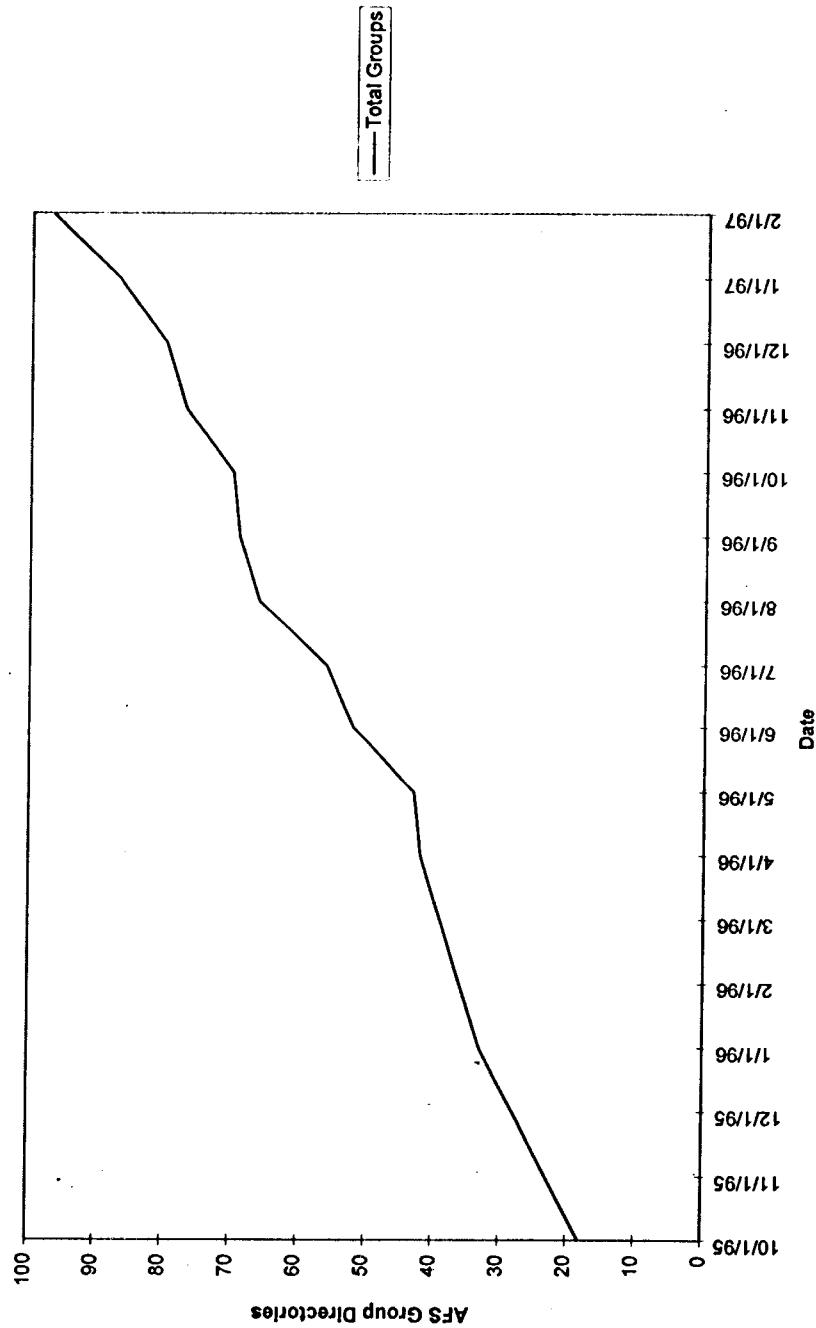
AFS User Requests History



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AFS Group Directories History

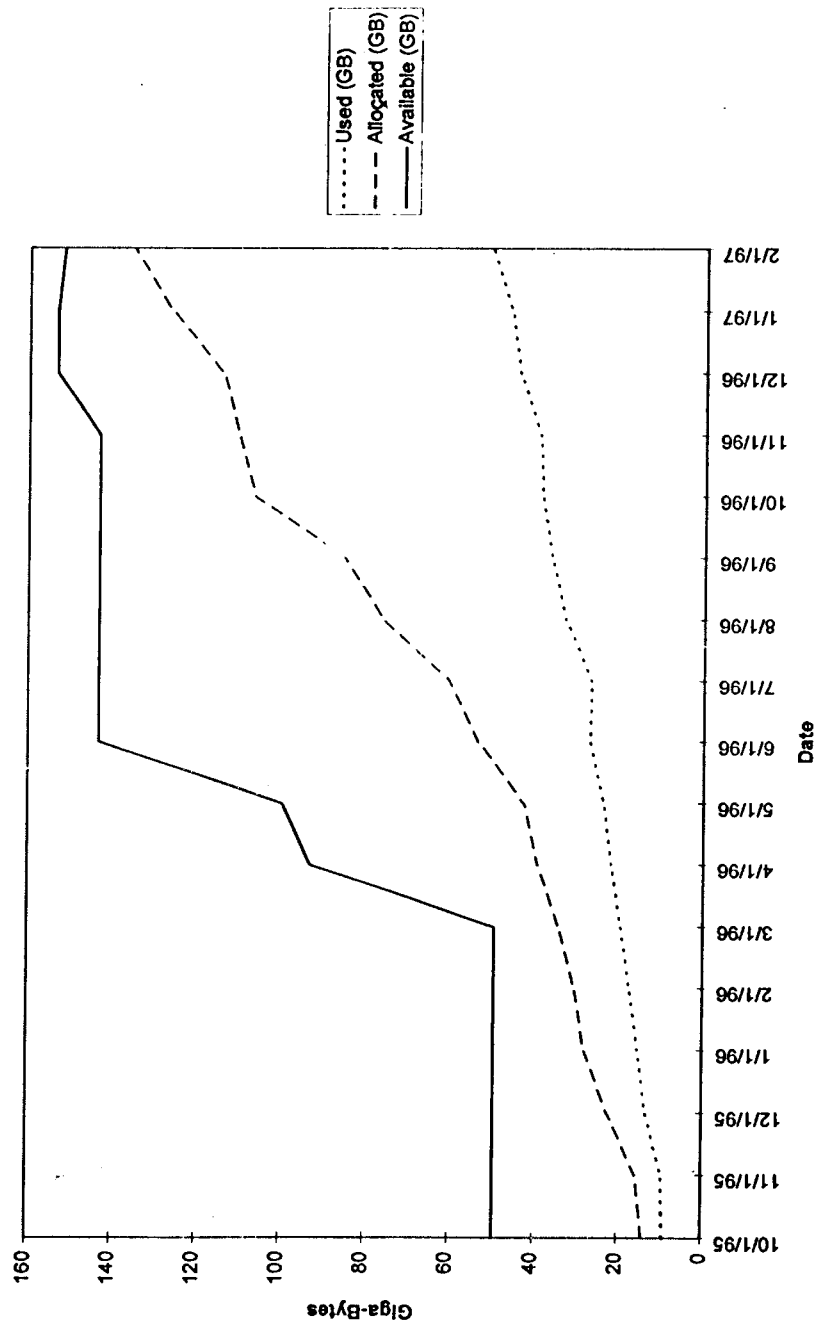
AFS Group Directories History



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AFS Disk Space History

AFS Disk Space History



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DFS Overview

- **DCE cell architecture has been defined by EIS project**
 - Includes authentication cell for people and DFS servers only
 - All other cells are for hosts and applications only
- **Hardware for major DCE and DFS servers is being put in place**
- **Automated procedures for account creation and modification through a web interface are being put in place**
- **DFS server and client software is installed from AFS; AFS is also used for configuration management**

DFS Clients

- **Unix**
 - Sun Solaris: Use Transarc native client
 - HP: Use HP native client
- **Windows**
 - Windows 95: Use Platinum Technology translator client
 - Windows NT: Use Transarc native client
- **Macintosh**
 - Macintosh 7: Use Platinum Technology translator client (still under evaluation)

DFS Clients (continued)

- **Legacy Issues**
 - Sun SunOS: Use Transarc AFS to DFS Translator
 - Windows 3.1: Use Platinum Technology translator client

DFS Servers

- **DCE Security Servers (not part of File Service)**
 - 2 DCE Security Servers initially (Sun)
- **DFS File Servers Servers**
 - 2 DFS File Servers initially (Sun)
 - Total of 126.0 GB in place (physical capacity)
- **DFS Protocol Translators**
 - 1 DFS Protocol Translator (planned)
- **DFS Web Servers**
 - 1 DFS Web Server (planned)

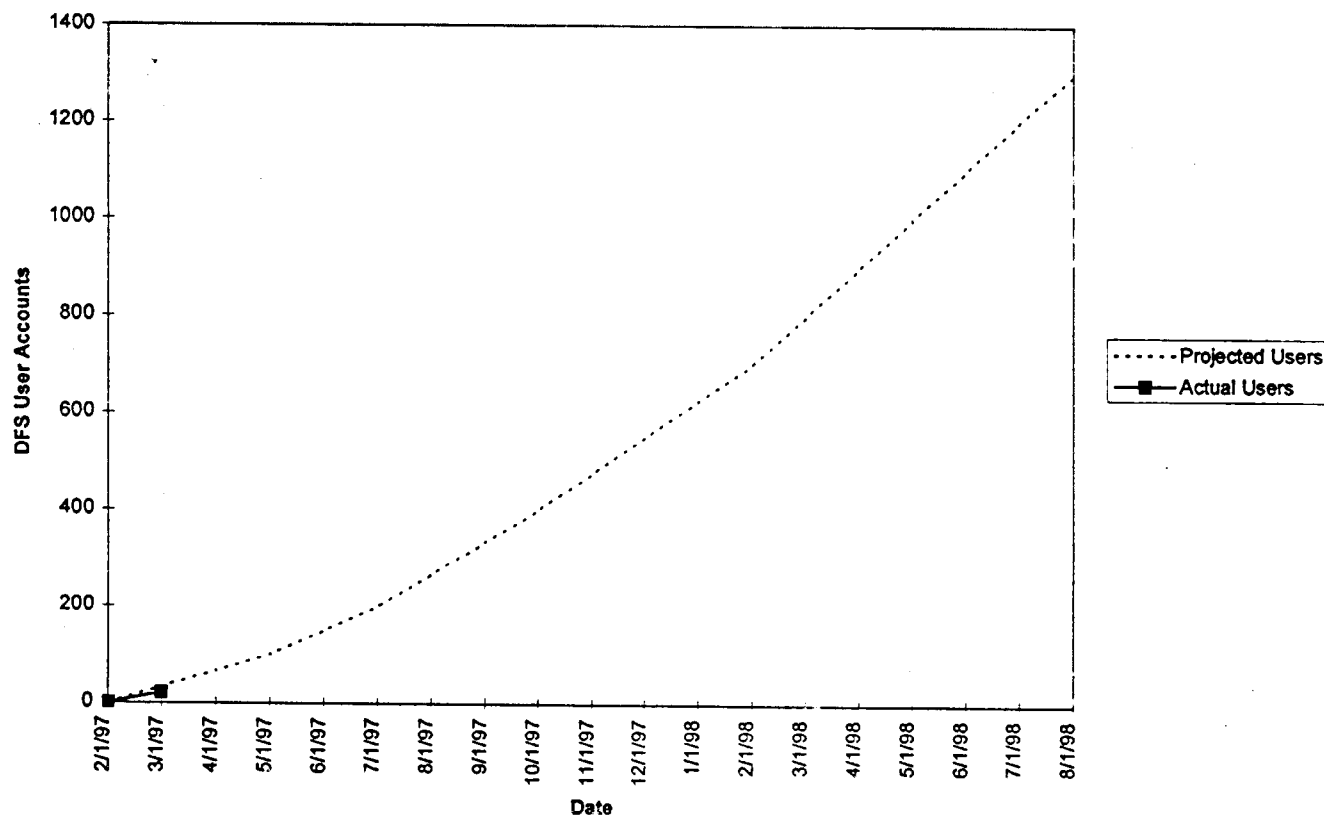
DFS Growth

- **DFS deployment is currently being focused on the Network Control Project for the Deep Space Network**
 - This has accelerated the deployment of the server components (both hardware and software)
- **Projection: DFS deployment for the whole laboratory will be constrained by the available resources (similar to AFS deployment)**

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DFS User Accounts History

DFS User Accounts History



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AFS to DFS Transition

- **Established a web interface to automate DCE account creation and DFS home directory creation**
 - Synchronizes DCE DFS username with AFS username
 - Will enable a web interface to change DCE DFS password
- **Will use AFS to DFS Translator from Transarc to move AFS volumes to DFS filesets**
- **Will test and verify DFS clients in JPL environment**
- **Will move selected users and groups from AFS to DFS**
- **Will announce general availability of DFS**

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Conclusion

- AFS has proven to be a robust and flexible distributed file system which has scaled to solve JPL's problems in a heterogeneous environment
- DFS is on the verge of expanding to take over the functionality which AFS provides
- DFS will expand with DCE at JPL; they will provide a common security and file model for new software applications which are critical to JPL's future

More Information

- A complete copy of George Rinker's slides will be available (March 3, 1997) on the World Wide Web at this location:
 - <http://eis.jpl.nasa.gov/~gcrinker/decorum97>
- You can also request a copy of the slides from the author at this email address:
 - george.rinker@jpl.nasa.gov